

RECOMMENDATIONS.

We are of opinion that the registration of the Meteorological Office as a company under the Joint Stock Companies' Acts should be cancelled, that the company should be wound up, and the office reconstituted as a department under the control of the Board of Agriculture and Fisheries.

The necessity for a council of seven having thus been got rid of, we recommend that the office be placed under the control of a man of science as director of meteorology, appointed after consultation with the Royal Society, but responsible to the Board of Agriculture and Fisheries, and making his annual report to that department. We recommend also the appointment of an advisory board, consisting of the hydrographer to the Admiralty, a representative of the Board of Trade, and one of the Board of Agriculture and Fisheries, and two members nominated by the Royal Society. The functions of the advisory board should be consultative only, the director being responsible to the Board of Agriculture and Fisheries for administration.

We recommend also that a second officer be appointed to act as scientific assistant to the director, to assist him in the general management of the office and in the discussion of such scientific problems as may arise.

The mean annual cost of this arrangement, as compared with that for the present council, we estimate thus:—

<i>Present Arrangement</i>	<i>Proposed Arrangement</i>
Council £850	Director £800 rising to £1000
Secretary 625	Scientific Assistant ... 450
£1475	Mean £1350

The fixed parliamentary grant of 15,300*l.* should be transferred to the vote for the Board of Agriculture and Fisheries.

Under such an arrangement the anomaly would cease of what is practically a department of the public service, though nominally a joint stock company, paying for postal and telegraph services money out of its fixed income. The charge for these services would not appear in the estimate, though undoubtedly the revenue would be the loser by the amount now repaid out of the parliamentary grant. The director of meteorology would not then feel, as the council now does, that the more complete and rapid the distribution of forecasts and warnings is made, the less money remains for scientific research and for overtaking arrears in the statistical work of the department.

Further, we judge it important that the Post Office should make arrangements at the twenty-seven reporting stations in the United Kingdom for the transmission of daily telegraphic reports one hour earlier than the present one of 8.15 to 8.30 a.m., and that storm warnings should, if practicable, have priority over all private messages at all hours.

We would direct attention to the expediency of testing the efficacy of wireless telegraphy in providing advance news of weather in the Atlantic. Such news would incalculably strengthen the forecast and warning service, and might, we believe, be obtained regularly over an experimental period by cooperation either with the Admiralty, the ocean steamship companies, or both. We would urge that no unnecessary delay should take place in organising this experiment.

We recommend that in future the cost of instruments supplied to His Majesty's ships be borne upon the Navy votes, except where such instruments are intended for use in research or observation specially called for by the director of meteorology.

We consider that the premises now rented by the council are neither suitable in character nor adequate in space for the present requirements of the office, and that others should be provided wherein the staff might perform their duties under more favourable hygienic conditions, and necessary accommodation for the rapidly growing library might be secured.

We recommend that the staff employed in the library, the statistical branch and observatory branch, should be augmented. The steps necessary to give effect to this and the preceding recommendation can best be determined when the future of the office has been decided upon.

We have carefully considered the effect of our recommend-

ations upon the apportionment of the present grant of 15,300*l.*

Our recommendations would involve a net increase of 449*l.* Another effect would be to reduce the Post Office revenue by the sum of about 2000*l.*, and to transfer to Navy votes, for instruments supplied to the Royal Navy, about 500*l.*

In default of an increase to the grant, the small increased expenditure which we have recommended would have either to be postponed or to be met from economies on other branches of the work of the office.

We have not included in the figures above given any increase in the average amount of the grant allocated to scientific research, nor have we found means of providing for increased telegraph expenditure which the adoption of the recommendations as to the transmission of earlier daily telegraphic reports, and of storm warnings, will very probably entail on the Post Office.

The evidence before us has shown conclusively the importance of further scientific research, for which we trust that funds may be forthcoming in the near future.

In minority reports Sir Herbert Maxwell and Sir William Abney express disagreement with that part of the report which deals with the action of the Meteorological Council in deciding to discontinue the annual payment to Fort William Observatory, involving the abandonment of the observatory on Ben Nevis.

Mr. Dewar objects to the action taken by the council in connection with superannuation; and Sir Francis Hopwood and Mr. T. L. Heath are unable to concur in the recommendations made by a majority of the committee (a) in so far as they would necessarily involve an increase in the annual grant, and (b) in so far as they relate to the transfer of this grant from the vote for scientific investigations, &c., to that of the Board of Agriculture and Fisheries.

NOTES.

THE following announcement of a munificent gift for scientific research appeared in Monday's *Times*:—Mrs. Percy Sladen, of Northbrook Park, Devonshire, in the desire to perpetuate the memory of her late husband, Mr. W. P. Sladen, sometime secretary and vice-president of the Linnean Society, has undertaken to devote the sum of 20,000*l.* to the promotion of scientific research, particularly in the subjects in which he was chiefly interested. She proposes to assign this sum under the name of the Percy Sladen memorial fund to certain trustees, in the first place of her own appointment, who are directed to employ the income arising therefrom, in their uncontrolled discretion, to "any research or investigation in natural science, and more especially in the sciences of zoology, geology, and anthropology." They are also empowered, if they think fit, to accumulate the income for the purpose of fitting out, or assisting to fit out, any expedition designed to further such research. The following gentlemen, whom Mrs. Sladen has requested to be the first trustees, have consented to serve:—her brother, Dr. Tempest Anderson, of York; Mr. Bailey Saunders, Mr. Henry Bury, Dr. Henry Woodward, F.R.S., Prof. Howes, F.R.S., and Prof. Herdman, F.R.S. On the occurrence of any vacancy among these trustees, Mrs. Sladen reserves to herself the right to nominate their successors; but by the deed of endowment it is provided that eventually five trustees shall be severally nominated for a period of five years each by the following bodies in rotation, so far as they may have signified their acceptance of the power of appointment:—the Royal Society, the Linnean Society, the trustees of the British Museum, and the Universities of Oxford and Cambridge.

As a result of a petition in 1902 from the Johannesburg branch of the South African Association for the Advancement of Science to the Governor of the colony, a Govern-

ment observatory is now in course of erection near Johannesburg. Mr. Theodore Reunert, as honorary secretary of the South African Association, has been specially active in securing the observatory, and he is to be congratulated on the success of his efforts. His representations led to the decision to form a meteorological department as a sub-department of the Colonial Secretary's office, and Mr. R. T. A. Innes was appointed its director. The site near Johannesburg selected for the observatory is at an elevation of about 200 feet above the Bezuidenhout Valley on the south, to which it dips almost precipitously. On the north the slope is considerable, the difference in height between the summit and the northern boundary of the observatory property being about 100 feet. The summit, which includes some two acres of fairly even ground, is 180 feet higher than Johannesburg, or about 5900 feet above sea-level. The prevailing winds ensure freedom from smoke and dust. The site covers 10.6 acres, and is estimated to be worth, at the market price, 10,000*l.* at least, though the actual cost was, owing to successful negotiations, only 2500*l.* While the observatory is being built the meteorological department is lodged in the New High Court Building in Johannesburg. Arrangements have been made for the establishment of 150 observation stations at various centres of the Transvaal under volunteer observers, and from these stations observations are regularly transmitted to the director of the Government Observatory, Johannesburg.

IN addition to a number of skins of small mammals, the Hon. N. C. Rothschild has recently presented to the British Museum the entire skeleton and skin of a Nubian wild ass, obtained by himself during a sporting trip to the eastern Sudan. The skin of this wild ass (*Equus asinus nubianus*) has been set up by Rowland Ward, Ltd., and is the first entire specimen of its kind exhibited in the museum. A second specimen is, we believe, being mounted for Mr. Walter Rothschild's museum at Tring.

AN announcement of special interest was made at the meeting of the Zoological Society of London held on June 7. So long ago as 1870 the late Prof. C. Peters described, under the name of *Dinomys branicki*, a remarkable pacalike rodent of which a single example had been found some time previously wandering about the courtyard of a house in Lima. From that day until a few months ago nothing more had been heard of this strange creature, which is regarded as representing not only a genus, but likewise a family by itself. Now, however, Dr. Goeldi announces that he has specimens of this rodent living in the museum under his charge at Pará. His description of these specimens will be awaited with great interest.

At a meeting held recently in Trinity College, Dublin, it was agreed that the great eminence of the late Provost, and his life-long connection with the university, demand a permanent commemoration in the form of some suitable memorial. A general and an executive committee have therefore been formed, and they invite the support of all graduates of Trinity College and other friends and admirers of Dr. Salmon in establishing a memorial to him. The exact form of the memorial will be decided at a meeting to be held later. In the meantime, subscriptions will be received and acknowledged by the honorary secretaries, Messrs. T. T. Gray, E. J. Gwynn, W. E. Thrift, and W. Kennedy, or the treasurers, the Right Hon. Mr. Justice Madden and the Right Hon. the Lord Justice Fitzgibbon.

A MURAL tablet erected by the Royal Institute of British Architects to the memory of the late Mr. F. C. Penrose, F.R.S., was unveiled in the crypt of St. Paul's Cathedral

on Saturday last. Sir L. Alma-Tadema, who performed the ceremony, remarked that Mr. Penrose's accurate measurements revealed how far the Greeks had gone beyond the use of the straight line into comprehension of the hidden curve. He showed, for instance, that the lines of the base of the Parthenon were curved in order to appear straight, and that columns on the same plane were made different in size in order to create a more perfect and harmonious impression of uniformity. It was Mr. Penrose who directed the strengthening of the Parthenon after the earthquake of 1894. His knowledge of astronomy led him to make valuable researches concerning the orientation of ancient temples; and work of the highest importance being done to-day in Greece by a band of young excavators, who had among other achievements, caused Crete to yield her buried treasures, was directly due to Penrose, through whom the British School of Archaeology at Athens came into being.

THE death is announced of Prof. Victor de Luynes, director of the laboratory of the French Minister of Finance.

THE *Daily Chronicle* announces that Prince Albert of Monaco has taken the lead in a movement for another North Pole expedition on a plan prepared by Ensign Charles Benard, late of the French Navy. The cost of the expedition is set down at 60,000*l.*, two ships being employed.

UPON the authority of the St. Petersburg correspondent of the *Journal*, of Paris, the *Times* announces that the installation of a service of wireless telegraphy at Lake Baikal is almost complete, and will be in working order by the end of the week. It will consist of three stations, one of which will be on board the ice-breaker, which will thus be enabled to communicate with both shores during its passage across the lake.

At the first meeting of the 1904 session of the Canterbury Philosophical Institute, held on May 4, the president, Dr. Charles Chilton, congratulated Captain Hutton on the publication of the "*Index Faunæ Novæ Zealandiæ*," and presented to him an album containing congratulatory addresses on the subject from the Canterbury Philosophical Institute, the Otago Institute, and from the various specialists who assisted Captain Hutton in the preparation of the "*Index*."

At the seventieth annual general meeting of the Royal Statistical Society on Tuesday, June 21, Sir Francis S. Powell, Bart., M.P., was elected president for the ensuing session. It was announced that the Guy medal (silver) had been awarded to Mr. D. A. Thomas, M.P., for his paper on the growth and direction of our foreign trade in coal during the last half century, the presentation to be made in November. It was also announced that the subject of the essays for the Howard medal, which would be awarded in 1905, with 20*l.* as heretofore, was: a critical inquiry into the comparative prevalence of lunacy and other mental defects in the United Kingdom during the last fifty years.

THE annual general meeting of the Palæontographical Society was held on Friday last, June 17, Dr. Henry Woodward, F.R.S., president, being in the chair. In the annual report of the council special reference was made to the activity at present prevailing among British palæontologists. The society has received more offers of monographs than it can accept for immediate publication, but it has expended more than 200*l.* of its accumulated funds in issuing an unusually large volume for 1903. Dr. Henry Woodward was re-elected president, Dr. George J. Hinde, F.R.S., was elected treasurer, and Dr. A. Smith Woodward was re-elected secretary.

At the Royal Agricultural Society's show, which was opened on Tuesday, there were in the building devoted to agricultural education and forestry a number of exhibits of interest. These came, for the most part, from the colleges where agricultural matters are taught. The Rothamsted Experiment Station sent a series of specimens of wheat and of loaves made from the flour of various samples. The results obtained, though illustrating the general experience that wheat containing much gluten yields "strong" flour that makes a big loaf, served rather to disprove the view that the quantity of nitrogenous matter present which is soluble in alcohol, or the ripeness or greenness of the corn, had any particular effect. In the bacteriological exhibit from the Midland Agricultural Institute were specimens which showed that Mr. John Golding has been able to confirm Mr. Charles Marshall's discovery (*Centralb. für Bakteriologie*, vol. xi., April) that if in a "milk starter" an alkali-forming germ is associated with one that produces lactic acid, "ripening" of the cream takes place much more rapidly. From the same institution came a large number of hybrid potato seedlings raised by Mr. E. Miles. The agricultural section of the Essex Technical Laboratories showed some charts proving that even if the application of sulphates to the soil does not result in a larger crop, it increases its feeding value, the result being due to the larger proportion of amides which are formed. There were also specimens illustrating some new experiments showing the beneficial effects of manures upon "clover-sick" and derelict land. Very striking were the results of applying pinches of sulphate of ammonium to a lawn containing plantains; while the latter were killed, the grass and clover were affected for the better. The chief feature of the Wye College exhibits were living specimens of plants infested with fungoid and insect pests. The Agricultural Department of Cambridge, Reading College, and Harper-Adams College were also well represented, as was the Royal Agricultural Society itself. The forestry exhibition was a new feature, and in it was a representative series of specimens of timber illustrating the healing of wounds and the life-history of plants and animals injurious to trees. There were also a large number of photographs illustrating various points in forestry, together with the examples of the tools used and plots laid out with young trees.

In the Harveian Oration delivered on Tuesday at the Royal College of Physicians, Dr. Richard Caton described some results of an inquiry into the earliest records of medicine in ancient Egypt, particularly as regards the circulation of the blood and diseases of the circulation. The most interesting figure among the early physicians of Egypt was a priest of Ra, the sun god, named I-em-hotep, who lived during the third dynasty, nearly 6000 years ago, and was succeeded by a cult of priest-physicians who carried on his work of healing. Temples for the worship of I-em-hotep, which were also hospitals for the sick, arose first at Memphis, and then extended to other parts of Egypt. Here the priests not only treated the sick, but also embalmed the bodies of men and the sacred animals. In this process the heart and viscera were removed, and the priests had thus an opportunity of learning something of anatomy and of the changes produced by disease. These priest-physicians were probably the first to acquire a rudimentary knowledge of the movement of the blood. It was clear that medical science was cultivated and had advanced considerably in Egypt long before it arose in Greece. In Egypt the evidence of this fact was decisive, and in the writings of the pseudo-Apuleius it was interesting to note that Hermes

told the youthful Asklepios of his predecessor, the first inventor of medicine, the Egyptian god I-em-hotep. When, in later times, Greek colonists came to Egypt, they recognised I-em-hotep as a sort of pre-existing Asklepios, and spoke of his temples as Asklepieia. The views of the circulation of the blood entertained by the Greeks were almost exactly those of their predecessors, the Egyptians; and, in view of the frequent intercourse between the two countries at that time, it was highly probable that the Greek physicians obtained their knowledge of the circulation, such as it was, from the Egyptians. The Egyptian priests seemed, in fact, to have been the first to engage in that momentous inquiry which was finally solved by Harvey, and on which the progress of medicine depended.

IN the article on geodesy which appeared in *NATURE* of June 2, referring to a contribution on the subject in the *Revue générale des Sciences*, it appears that, inadvertently, the author hardly did justice to the scientific investigations of MM. Benoit and Guillaume, the director and assistant director of the Bureau International des Poids et Mesures. The apparatus represented in Fig. 1 of our article is entirely new, and is due to the inventive faculty of those gentlemen and not to that of M. Jäderin. That useful combination of metals known as invar is also the result of researches instituted at the Bureau International, the officers of which department may well congratulate themselves on the successful results of those investigations which they have initiated in all branches of research connected with geodesy.

THE *British Journal of Photography* has just completed its fiftieth year. To mark this occasion, the editor has issued a special (jubilee) number of the journal, containing not only "the story" of the journal from its commencement to the present time, written by himself, but a series of most interesting articles by different authors on a great number of photographic topics. The *British Journal of Photography* is the outcome of the photographic energy displayed in Liverpool in the 'fifties, the first number, entitled the *Liverpool Photographic Journal*, appearing on January 14, 1854. In the "story" are given facsimiles of the title-page and the first page of this journal, and also that of the first page under the present title. Short biographical sketches of the editors and assistant editors are also included.

DR. J. HANN recently submitted to the Vienna Academy of Sciences a work on the decrease of temperature with height up to 10 kilometres, deduced from the results of the international balloon ascents so far as they have been published. He found that the monthly means were too much influenced by the weather conditions of the days on which the ascents were made to show a tolerably trustworthy yearly range. But dealing with the differences of temperature for intervals of 1 kilometre, that is, with the values of the decrease of temperature with height, he was able to obtain more satisfactory and somewhat striking results. The yearly range of the differences for 1 to 3 kilometres exhibited the quickest decrease of temperature between May and June. At altitudes of 3 to 5 and 5 to 7 kilometres, the quickest decrease occurred in March and April, while at the height of 7 to 9 kilometres it occurred quite unexpectedly about the beginning of July. As first pointed out by M. Teisserenc de Bort, the decrease of temperature with height in the lower strata of air is slower in anticyclones than in cyclones, while at great heights these conditions are reversed.

DR. VIDI, in a popular article, gives some interesting details with regard to cancer houses and districts (*Le Journal*,

Paris, May 5). One striking instance is given of a cancer district, viz. at Luckau, a small town in northern Prussia, where Behla has investigated the incidence of cancer from 1878 to 1899. The town consists of two portions, one on higher ground, which is well drained and consists of 415 houses, the other low-lying, damp, and surrounded with canals, consisting of 115 houses. In the latter, during the twenty years, seventy-five cases of cancer occurred, while in the former, nearly four times as large, only sixty-five cases occurred during the same period.

ON a previous occasion reference has been made in our columns to the investigations of Dr. C. H. Eigenmann into the structure of the eye of the blind fishes (Amblyopsidae). A fuller and more detailed memoir by the same investigator on the eye of Amblyopsis has recently been published in *Contributions from the Zoological Laboratory of Indiana University* (No. 50). The author finds that although the foundations of the eye are normally laid, instead of developing with the aid of new material, the superstructure is completed out of that provided for the foundation, and that in the end complete disintegration takes place.

WE have received from the U.S. National Committee of Audubon Societies a batch of leaflets (published at New York) on bird protection and on the teaching of ornithology in schools, and likewise the combined report of that body and the A.O.U. Committee on the Protection of North American Birds for 1903, extracted from the *Auk* for January. The leaflets contain excellent portraits and descriptions of some of the most beneficial of North American birds, one being specially devoted to the snowy heron, or egret, and to the oft-told tale of the iniquity of wearing "aigrettes" and "ospreys." The report, which is illustrated with reproductions from photographs of bird life in protected localities, emphasises the satisfactory results which have accrued from the special protection extended to gulls and terns by means of the Thayer fund.

IN his usual interesting style, Mr. E. T. Seton, in the June number of the *Century Magazine*, gives an account of the labours of the little burrowing rodents commonly known as pocket-gophers, and their effect on the soil. According to the author's personal observations, true earth-worms are unknown in Manitoba, and, indeed, in all that part of North America lying to the south of the Saskatchewan and west of the Mississippi, with the exception of a narrow humid belt along the Pacific coast; and it would seem that the work performed by those annelids in other parts of the world is accomplished in western North America by pocket-gophers. In Manitoba the surface soil consists of a layer of black humus from a foot to two feet in thickness, and there can be little doubt that this layer, which is not a solid bed of decayed vegetation, has been thoroughly mixed up with the subjacent loam by the action of burrowing rodents, foremost among which are pocket-gophers.

APPENDIX iii. to the Kew *Bulletin* has been received, which contains a list of the new garden plants of the year 1903.

In the *Journal of the Asiatic Society of Bengal*, No. 4, vol. lxxii., Sir George King, F.R.S., in conjunction with Mr. J. S. Gamble, F.R.S., continues the "Materials for a Flora of the Malay Peninsula." The contribution contains the order Caprifoliaceæ (three species of *Viburnum*), and those species of the Rubiaceæ which possess numerous ovules in each cell of the ovary. This tropical order is well represented, and the authors have added a number of new species, including fourteen for *Argostemma*, nine

for *Randia*, and four for the morphologically interesting genus *Mussaenda*.

THE subject of nuclear fusion in vegetative cells is treated in three papers by Dr. Nemeš which have appeared in the *Sitzungsberichte* of the Royal Scientific Society of Bohemia (1902, 1903). By the action of such irritant solutions as copper sulphate or chloral hydrate, it is possible to induce anomalous developments in the cells of the meristematic region of seedling roots whereby the formation of the cell wall consequent to cell division is suspended, and a bi-nuclear condition is established. Fusion of the two nuclei follows, and the resulting nucleus in the succeeding division shows twice the ordinary number of chromosomes. This number is maintained for a time, but eventually a reduction takes place, and the ordinary number of chromosomes appear on the spindle.

WE have received from Messrs. Armbrrecht, Nelson and Co. a fine example of flexible sandstone, known also as itacolomite, from its occurrence on Itacolumi, a mountain near the town of Ouro Preto, in the State of Minas Geraes in Brazil, where it was first discovered. This variety of rock has been found in several localities in the United States, and also in India. Examples were obtained by the late General C. A. McMahon from Kalliana, a hill near Dadri, about 60 miles west of Delhi. He regarded it as a local and modified form of the quartzite of the district. Certain beds of earthy cellular quartzite are there quarried for millstones, and the stone-cutters come abruptly upon the flexible stone when engaged in quarrying. This stone occurs in irregular patches, and its flexibility appears to be due to the partial removal of the felspathic cement to which the rigidity of the mass of the adjacent rocks is due. The rock does not possess a schistose structure, and the flexibility is not due to the presence of talc or mica, the peculiar character being due to the decomposition or dissolution of portions of the matrix of the quartzite.

PROFESSIONAL paper No. 9 (forestry series) of the United States Geological Survey deals with the forest conditions in the Cascade Range Forest Reserve, and forms the sixth paper of the series. A description of the first five papers will be found in *NATURE*, vol. lxxviii. p. 406. The Cascade Range Forest Reserve covers an area of 7254 square miles, and is the largest of all the reserves. The introduction deals with the general topographical, geological, and climatic features of the area, the classification of lands, such as forested, burned, open, &c., together with the total stand of timber, which exceeds 50,000,000,000 feet. The species are varied, although the timber consists almost entirely of conifers. The reserve is divided into thirty-seven townships, which are again subdivided into ranges. The bulk of the report deals with the classification of lands, stand of timber, species, and forest conditions in the several ranges. The value of the report is greatly enhanced by the forty-one illustrations, consisting of photographs, maps, and diagrams.

WE have received from Messrs. A. and J. Smith, of Aberdeen, a descriptive catalogue containing full particulars of Prof. Hay's apparatus devised for the investigations conducted by Dr. Leslie Mackenzie and himself for the Royal Commission on Physical Training. In addition, the list contains information of other appliances suitable for the measurement of children.

THE most recent addition to the Patent Office Library Series is the "Subject List of Works on Electricity, Magnetism, and Electro-Technics, in the Library of the

Patent Office," which costs sixpence. The list consists of two parts; first, a general alphabet of subject headings, with entries in chronological order of the works arranged under these headings, and, secondly, a key, or a summary of these headings shown in class order. The list comprises 2374 works, representing 3792 volumes.

THE series of eight lectures on "Physical Chemistry and its Applications," delivered some time ago by Prof. J. H. van 't Hoff at the invitation of the University of Chicago, has recently been translated into French by Prof. Corvisy (A. Hermann, Paris). No higher tribute to the intrinsic merit of these most readable lectures could be desired, and they will no doubt be warmly received by a large circle of French readers.

SOME noteworthy experimental results communicated by Messrs. van Calcar and Lobry de Bruyn to the current volume of the *Recueil des Travaux chimiques des Pays-Bas*, vol. xxiii. p. 218, show that considerable changes take place in the concentration of solutions under the influence of centrifugal forces. The concentration increases from the axis of rotation towards the periphery, and the changes have been accurately measured in the case of potassium iodide and cane sugar. Portions of a solution of potassium iodide of 0.2035 normal concentration, removed respectively from points near the axis of rotation and some distance away, were found to be 0.1065 normal and 0.325 normal. These portions of solution were removed after centrifuging for three hours at the rate of 2400 revolutions per minute. A saturated solution of Glauber's salt, containing 8.8 per cent. Na_2SO_4 , deposited 57 grams of solid $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ at the periphery after being rotated for five hours, and the remaining solution was found to contain only 5.5 per cent. of sodium sulphate. It is calculated that the applied force acting on the molecules at the periphery (radius of rotation = 6 cm.) in these experiments was more than 400 times greater than gravitational force.

In the *Revue de Metallurgie* for April, M. H. Le Chatelier re-states and explains his views on the constitution of the carbon-iron alloys. He points out the importance of classifying the constituents of heterogeneous bodies, and again directs attention to the similarity between alloys and igneous rocks. In chemical classification it is necessary to give the chief place to the conception of phases, and to regard chemical composition as of secondary importance. If chemical composition alone were used for purposes of classification, there would be no distinction, for example, between crystallised granite and fused granite, although the former contains three phases, quartz, felspar and mica, and the latter contains only one phase. Moreover, it is desirable to give names to the phases, even when they are solid solutions of variable composition. One of the great difficulties in determining the phases in the steels is that the individual crystals are generally so minute that they cannot be isolated, and their properties and chemical composition cannot be exactly determined. Nevertheless, some progress has been made in the recognition of the various phases that may occur. M. Le Chatelier believes that these phases include iron in its various allotropic forms; carbon in the form of graphite; cementite, or Fe_3C ; and many solid solutions containing iron and either carbon, nickel, manganese, phosphorus, silicon, or other elements. Most of these phases have not yet received names, but the highly important carbon-iron solutions have been called troostite, martensite, and austenite. The homogeneity of these phases has been called in question, but the attempts to prove that they are heterogeneous have not yet been successful.

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Difficulties are occasioned by the similarity of the properties of these three solutions, and the evidence that they are distinct rests mainly on their appearance under the microscope after treatment by different reagents. It is scarcely necessary to add that these views are not shared by some students of metallography.

OUR ASTRONOMICAL COLUMN.

THE GOVERNMENT OBSERVATORY, BOMBAY.—The report of the Bombay Observatory for the year ending December 31, 1903, signed by the director, Mr. N. A. F. Moos, gives an account of the many and varied observations carried out there. The instrumental equipment is extensive and in good order, the records of failure by the automatic registering instruments being very few.

The rainfall for the year was 84.49 inches, a surplus of 9.33 inches above the average of the twenty-four years 1873–1896. The daily wind pressures and temperatures were recorded regularly, and many magnetic and seismographic observations were made daily. Routine observations with the transit instrument, to check the standard clocks, were made at regular intervals, and a very good time service was maintained at the docks and other public places. The rating and adjustment of chronometers and deck-watches for Government departments and ships, and for private ship owners, formed an important part of the year's work.

NEBULOUS AREAS OF THE SKY.—In an article published in *Popular Astronomy* (No. 6, vol. xii.), Prof. H. C. Wilson, of the Goodsell Observatory, discusses the subjective existence of the large nebulous areas of the sky as described by Sir William Herschel. He fully confirms Herschel's observations, and considers that the negative results obtained by Dr. Roberts last year must have been due to unfavourable observing conditions. Further, he shows by a reproduction of one of his own beautiful photographs of the Pleiades region, which was taken with a 6-inch Brashear star-camera, that at least one of the regions described by Dr. Roberts as containing no nebulosity is in reality filled with nebulous matter, covering as many square degrees as Herschel allotted to the whole of the nebulosities in his fifty-two regions.

PROFS. Wilson and Payne intend transporting their photographic equipment to a station situated in the western Montana mountains at an altitude of about one mile, so that during July and August they may test the suitability of the atmosphere at that altitude for photographing the nebulous patches of the Milky Way, and, if possible, obtain further confirmatory photographs of Herschel's regions.

LIGHT CURVE OF δ CEPHEI.—From an exhaustive discussion of the available data concerning the magnitude variations of δ Cephei, M. Beliafsky, of St. Petersburg, has derived the following elements:—

Minimum 0 = 1840 September 24.833d. M.T. Bonn.
Period = 5.36642 days.

The period between a maximum and the succeeding minimum, according to the curve, is 1d. 11.184h., and this value is very near the mean of the values obtained by five previous workers. The light of the star varies between magnitudes 4.37 and 3.57, and M. Beliafsky gives the estimated magnitude for every 0.1 day between two succeeding minima (*Astronomische Nachrichten*, No. 3952).

POSITION OF THE AXIS OF ROTATION OF MARS.—*Bulletin* No. 9 of the Lowell Observatory gives the results of a new determination of the position of the axis of rotation of Mars, made by Mr. Lowell. The direct method was employed, the position angle of the tangent to the limb at the nearest point to the polar cap being measured with a micrometer. The varying inclination of this tangent to the horizontal renders necessary the tilting of the observer's eyes in some positions; presuming that this might affect the resulting measures, Mr. Lowell has differentiated the results accordingly, calling them "expurgated" or "unexpurgated" as the time of observation was less or more than three hours after the horizontal position of the tangent.